

REMARKS**Claim Status**

Claims 1-33 were pending in this application. Claims 1, 20, and 29 have been amended. Claims 1-33 remain pending in this application.

Claims 1 and 20 have been amended to more clearly lay out the steps of the process. Claim 29 has been amended to remove an inadvertently presented multiple dependency. Support for these amendments may be found throughout the specification and claims, as originally filed. Now new subject matter has been presented, by way of these amendments.

Claim Rejections- 35 USC § 101

Claims 29-31 were rejected under 35 USC § 101 as being directed to non-statutory subject matter. The Examiner stated that the rejected claims are directed to a culture of enumerated fungal cells and that all of the claimed fungal cells are naturally occurring and therefore not a “manufacture”, within the context of 35 USC § 101.

To comply with 35 USC § 101’s patentable subject matter requirement, a claim must be directed to an enumerated statutory category and the claim must not fall within a judicial exception to 35 USC § 101 (*i.e.*, laws of nature, natural phenomena, and abstract ideas). See MPEP 2106.B.-C.

Applicants respectfully assert that claims 29-31 are directed to an enumerated statutory category as a manufacture and do not fall within a judicial exception, in that the claims are directed to non-naturally occurring combinations of naturally occurring cells. Notably, claims 29-31 require that the starter culture comprises *Chalara parvispora* and at least one additional fungus selected from an enumerated list. Applicants respectfully assert that the Examiner has not established a *prima facie* case that such a combination of fungal cells is naturally occurring.

Applicants respectfully request that the rejection of claims 29-31 under 35 USC § 101 be withdrawn.

Claim Rejections- 35 USC § 103

Claims 1-33 were rejected under 35 USC § 103(a) as being unpatentable over US Pat. No. 4,840,903 ("Wu") in view of Nag Raj and Hughes, *New Zealand J. of Botany*, 12: 115-29 (1974) ("Nag Raj"), further in view of Lee *et al.*, *Biotechnology Letters*, 21: 965-68 (1999) ("Lee"), further in view of Duff and Murray, *Bioresource Technology*, 55:1-33 (1996) ("Duff"), further in view of Sun *et al.*, *Bioresource Technology*, 83: 1-11 (2002) ("Sun"), and further in view of Clausen *et al.*, *Proceedings of the 4th Meeting of the Pan American Biodeterioration Society*, New York Press, p. 231-242 (1994) ("Clausen").

Independent Claim 1 and Dependents Thereof

Independent claim 1, from which claims 2-19 depend, is directed to a process for the production of ethanol by metabolizing pentose compounds of organic starting materials using at least one fungus belonging to the species *Chalara*, said fungus being capable of metabolizing pentose compounds to produce ethanol. Applicants respectfully assert that the cited references, alone or in combination, do not render obvious the subject matter of claim 1, and the claims that depend thereon.

The Examiner states that Wu teaches a process for the production of ethanol through the fermentation of organic materials by a fungus capable of metabolizing xylose (a pentose) and glucose. The Examiner acknowledges that Wu does not teach *Chalara parvispora* or *Trametes versicolor*. In addition to the Examiner's statements, Applicants further note that Wu does not teach the use of any fungus of a species other than *Paecilomyces sp.* The Examiner further states that Nag Raj teaches *Chalara parvispora* and *Chalara* species capable of growing on wood and decayed wood.

However, the Examiner has not articulated a rational to combine the references and support a conclusion of obviousness. See “Examination Guidelines for Determining Obviousness...”

Federal Register, Vol. 72, No. 195, p. 57526-57535, at page 57528. Specifically, the Examiner has not indicated a teaching, suggestion, or motivation to combine Wu and Nag Raj or, alternatively, why it would be “obvious to try” a fungus of *Chalara sp.* with the method of Wu.

The Examiner has not shown that *Paecilomyces sp.* and *Chalara* are closely related fungi species, such that it would be obvious to try *Chalara* in the method of Wu. For example, *Mycologia*, 94(1), pp. 62-72 (2002), a phylogenetic and taxonomic evaluation of *Chalara Chalaropsis* does not discuss any relation between the fungus *Paecilomyces sp.* So, while Wu teaches that the fungus *Paecilomyces* can produce ethanol during anaerobic conditions it would not be obvious to look for alternative ethanol producing fungi in a non-closely related fungus family, baring a teaching or suggestion to do so.

Further, in reviewing Nag Raj, a monograph on the genus *Chalara*, one of skill would note that it may be naturally found on wood in aerobic environments (typically containing 19-20% oxygen). However, claim 1 is directed to a process under anaerobic conditions and a person of skill in the production of ethanol would know that both yeast and fungi need a low oxygen environment or an anaerobic atmosphere to produce ethanol. With this knowledge, it is far from obvious that a fungi growing on wood in nature can produce ethanol, especially under the required anaerobic conditions. Accordingly, Nag Raj does not give any idea or hint that the genus *Chalara* can produce ethanol during anaerobic conditions, such that one of skill would have an expectation of likely success in employing *Chalara sp.* in producing ethanol.

In summary, it would not be obvious to a person of skill to employ *Chalara sp.*, as disclosed by Nag Raj, with the method of Wu, baring a teaching, suggestion, or motivation to combine, which has not been identified by the Examiner. Nor is there any indication that Lee, Duff, Sun, or Clausen provide a teaching, suggestion, or motivation to combine *Chalara sp.* with the method of Wu.

Applicants respectfully request that the rejection of claim 1, and the claims that depend thereon (2-19), under 35 USC § 103 be withdrawn, for at least the reasons stated above.

Independent Claim 20 and Dependents Thereof

Independent claim 20, from which claims 21-28 depend, is directed to a process for the production of ethanol from a starting material consisting substantially of waste or by-products from forestry, the process comprising metabolizing pentose compounds of the starting material consisting substantially of waste or by-products from forestry using at least one fungus belonging to the species *Chalara*, said fungus being capable of metabolizing pentose compounds. Applicants respectfully assert that the cited references, alone or in combination, do not render obvious the subject matter of claim 1, and the claims that depend thereon.

In addition to the arguments presented above with respect to claim 1, which Applicants assert are equally applicable to claim 20 and its dependents, Applicants further note that the experimental results presented in figures 1 - 5 of Wu were achieved with pure sugars, *i.e.*, well-defined organic materials without any traces of inhibitor. One of skill in the art would understand that a starting material consisting substantially of waste or by-products from forestry would include non-purified organic compounds, such as wood hydrolysate (Exp. 1 and 2, results in Table 2) and lignocellulose in pulp waste (Exp. 4). Both these organic starting materials have a high degree of unknown inhibitor factors to several organisms. Accordingly, one of skill in the art would not have a reasonable expectation of likely success in employing *Chalara sp.* with the method of Wu on materials that contain a high degree of unknown inhibitor factors, such as waste or by-products from forestry.

Applicants respectfully request that the rejection of claim 20, and the claims that depend thereon (21-28), under 35 USC § 103 be withdrawn, for at least the reasons stated above.

Remarks Specific to Dependent Claims 3, 5-7, 22, 24-26

In addition to the reasons stated above with regards to independent claims 1 and 20, Applicants respectfully assert that the Examiner has not articulated a rational for why it would be obvious to employ mixtures of fungi comprising *Chalara sp.* and *Trametes sp.* fungi in a process for producing ethanol, as particularly claimed in claims 3, 5-7, 22, 24-26.

The Examiner states that “at the time the invention was made the advantages of mixed fermentation cultures were known in the art (Duff & Murray p. 21-22).” However, pages 21-22 of Duff teach co-culturing of *Zymomonas* and *Clostridium*, two ethanol producing bacteria. Additional examples discuss the use of different genetically-modified bacteria, such as *Klebsiella* and *E. coli* in combination with yeast. However, the cited references, including Duff, do not discuss a mix of at least two fungi, especially not in the context of producing ethanol and not in the context of overcoming the problem with inhibitors, as described in the present application. Accordingly, the cited art, individual or in combination, does not teach every limitation of the rejected claims.

Further, the Examiner has not articulated a rational for why it would be obvious to specifically employ *Trametes sp.* fungus in combination with *Chalara sp.* The Examiner states that Lee teaches ethanol is an effective stimulator of laccase production in a culture of *Trametes versicolor*, and that Lee further teaches the important role of laccase in degrading lignin in wood pulp and in decolorizing and detoxifying effluents generated by the pulp and paper industry. However, Lee does not provide any teaching of what type of degradation products and/or compounds (such as pentoses) would be generated by the enzyme laccase. Thus, a person of skill producing ethanol with the fungus *Trametes* would not have an expectation that wood pulp or hydrolysate will necessarily work for a process of ethanol production using fungi that metabolize pentoses. Further, while Lee teaches that ethanol is beneficial to the production of laccase, Lee does not teach why laccase would be beneficial to the production of ethanol. Accordingly, there is no teaching, suggestion, or motivation to combine *Trametes versicolor*, as taught in Lee, with *Chalara sp.*, as taught in Nag Raj, in the method for producing ethanol taught by Wu.

Claims 29-31

Claims 29-31 are directed to a starter culture comprising *Chalara parvispora* and at least one additional fungus from an enumerated list of fungi, for use in a process of producing ethanol. Applicants assert that claims 29-31 are non-obvious over the cited art, which does not teach a mix of at least two fungi for use in a process of producing ethanol, as discussed in the preceding section. Again, while Duff teaches the benefits of a mixed fermentation culture of bacteria, Duff fails to teach a mixed culture of fungi. Accordingly, the cited art fails to teach, individually or in combination, every limitation of the rejected claims.

Applicants respectfully request that the rejection of claims 29-31 under 35 USC § 103 be withdrawn, for at least the reasons stated above.

Claims 32 and 33

Claims 32 and 33 are directed to a growth medium for a fungus for use in the process for the production of ethanol of claim 1. It appears that the Examiner has not laid out the rational and elements of a *prima facie* case of obviousness in the office action dated October 25, 2007. Accordingly, Applicants respectfully request that the rejection of claims 32 and 33 under 35 USC § 103 be withdrawn.

Conclusion

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicants petition for any required relief including extensions of time and

authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing **docket no.**

616562000300. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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